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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/511,186

08/02/2005

Hiroyuki Itou

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EXAMINER

GREEN, TRACIE Y

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/511,186	<b>Applicant(s)</b> ITOU ET AL.	
	<b>Examiner</b> TRACIE Y. GREEN	<b>Art Unit</b> 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/11/2004</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

Receipt is acknowledged of applicant's amendment filed 10/11/2004.

#### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Saito et al. (US 2002/0031465 A1).

**Regarding claim 1**, Saito teaches a field electron emission film (Figure 1) used for a field electron emission electrode, comprising: carbon nanotube structural body of 0.001 to 40% by weight (Table 1 (Paragraph 57, lines 105 and Paragraph 45, lines 6-7); and a heat decomposition product obtained by heat decomposition of a heat-decomposable metal compound (Paragraph 47, lines 5-8).

**Regarding claim 2**, Saito teaches wherein; said heat-decomposable metal compound is an organo-metallic compound (Paragraph 47, lines 5-8).

**Regarding claim 6**, Saito teaches wherein; said heat decomposition product is composed of a plurality of metals. (Paragraph 51, lines 10-12)

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 2002/0031465 A1) in view of Talin et al. (US 2003/0111946 A1)

**Regarding Claims 3-4**, Saito et al. (Saito, hereafter) teaches the field emitter film set forth above (see rejection claim 1). Saito is silent regarding wherein said heat-decomposable metal compound is metal salt (claim 3) or an organo-metallic salt compound (claim 4).

In the same field of endeavor field emission devices, Talin et al. teaches (Figure 5) wherein said heat-decomposable metal (16) compound is metal salt (Paragraph 14, lines 19-22) or an organo-metallic salt compound (Paragraph 14, lines 14-16) in order to provide an emission film that does not require mechanical polishing and has a more uniform distribution (Paragraph 8, lines 17-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission film of Saito wherein the heat-decomposable metal compound is metal salt or an organo-metallic salt compound in order to provide an emission film that does not require mechanical polishing and has a more uniform distribution as taught by Talin et al.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 2002/0031465 A1) in view of Akiyama et al. (US 6,914,372)

Saito et al. (Saito, hereafter) teaches the field emitter film set forth above (see rejection claim 1). Saito is silent regarding said heat-decomposable metal compound is metal complex.

In the same field of endeavor field emission devices, Akiyama et al. teaches said heat-decomposable metal compound is metal complex (Column 10, lines 17-23) (*Examiner note-Iron and Cobalt and their alloys are known to form complex bonds in an organic solvent*) in order to provide a device that is easier to assemble, more stable under normal operating conditions (Column 2, lines 60-65).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission film of Saito wherein the heat-decomposable metal compound is metal complex in order to provide a device that is easier to assemble, more stable under normal operating conditions as taught by Akiyama et al.

6. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 2002/0031465 A1) in view Kajiwara et al. (US 2003/0102797).

Saito et al. (Saito, hereafter) teaches the field emitter film set forth above (see rejection claim 1). Saito is silent regarding said the film has a plurality of metals are Sn and at least one metal selected from In and Sb (claim 7) and plurality of metals are Sn and In, where ratio of Sn to In is 6 at % or more (claim 8)

In the same field of endeavor field emission devices, Kajiwara teaches said plurality of metals are Sn and at least one metal selected from In and Sb (Table 1, row 1) and plurality of metals are Sn and In, where ratio of Sn to In is 6 at % or more (Table 1, row 1) (*Examiner note : the table discloses both tin and indium can be added in various amounts*) in order to provide a device with nanotubes with great adhesion, conductivity, and improved electron emission.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission film of Saito the film has a plurality of metals are Sn and at least one metal selected from In and Sb and plurality of metals are Sn and In, where ratio of Sn to In is 6 at % or more in order to provide a device with nanotubes with great adhesion, conductivity, and improved electron emission as taught by Kajiwara.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 2002/0031465 A1) in view of Filas et al. (US Patent 6,741,019)

Saito teaches the field emitter film set forth above (see rejection claim 1). Saito is silent regarding the thickness of said field electron emission film is 0.05 .mu.m to 20 .mu.m.

In the same field of endeavor field emission devices, Filas et al. teaches the thickness of said field electron emission film is 0.05  $\mu\text{m}$  to 20  $\mu\text{m}$  (Paragraph 13, lines 27-35) in order to provide a device which remains compact in size, improved in alignment of nanostructures and improved fabrication processes (Column 3, lines 19-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission film device of Saito the thickness of said field electron emission film is 0.05  $\mu\text{m}$  to 20  $\mu\text{m}$ . in alignment of nanostructures and improved fabrication processes as taught Filas et al.

8. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. (US 6,914,372) in view of Saito et al. (US 2002/0031465 A1).

**Regarding claims 10-11**, Akiyama et al. teaches (Figure 7) a cathode (102), an insulating film (702), and a gate electrode (701) sequentially formed on a support (101); an opening (703) formed in common in the insulating film (104) and the gate electrode (701); and a field electron emission film (105) formed at least on the cathode (102) exposed in the opening (703). Akiyama et al. also teaches a heat decomposition product obtained by heat decomposition of a heat-decomposable metal compound (Column 21, lines 14-20)

Akiyama is silent regarding the electron emission film comprises 0.001 to 40% by weight of carbon nanotube structural body.

In the same field of endeavor field emission devices, Saito et al. teaches the electron emission film comprises 0.001 to 40% by weight of carbon nanotube structural

body (Table 1 (Paragraph 57, lines 105 and Paragraph 45, lines 6-7) in order to provide a device with vertically nanotubes with high production efficiency and that is narrow in diameter (Paragraph 12, lines 1-3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission device of Akiyama et al. with the electron emission film comprises 0.001 to 40% by weight of carbon nanotube structural body in order to provide a device with vertically nanotubes with high production efficiency and that is narrow in diameter as taught by Saito et al.

**Regarding claim 12**, Akiyama teaches (Figure 8) a cathode panel (101 having a plurality of field electron emission electrodes (105) disposed thereon; and an anode panel (106) having a fluorescent layer (108) and an anode disposed (107) thereon, the both panels (Figure 19, 2013) being bonded at the individual circumferential portions

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRACIE Y. GREEN whose telephone number is (571)270-3104. The examiner can normally be reached on Monday-Thursday, 7:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571/272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for



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/Tracie Y Green/  
Examiner, Art Unit 2879

/Sikha Roy/  
Primary Examiner, Art Unit 2879